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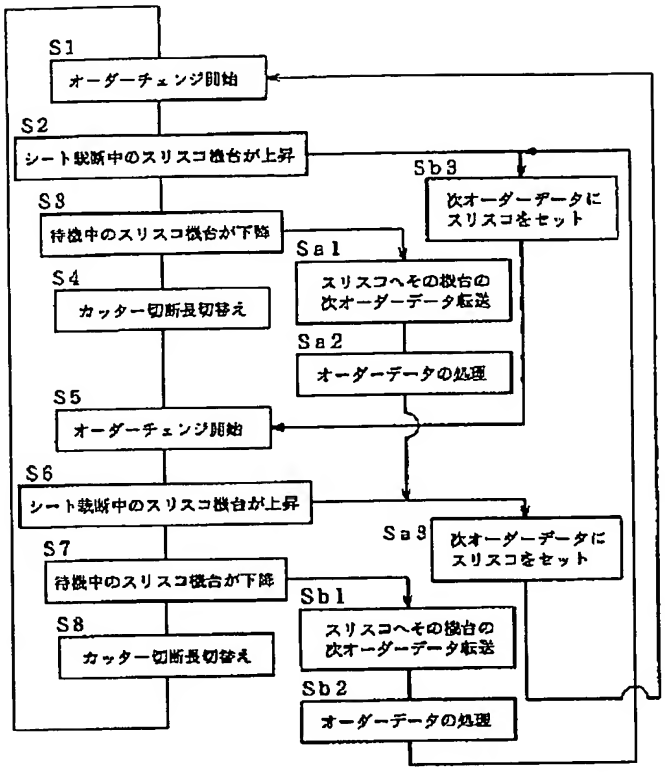
TITLE : ORDER CHANGE CONTROL DEVICE FOR SHEET FABRICATION SYSTEM



ABSTRACT : PROBLEM TO BE SOLVED: To minimize the period of time required until the setting of an order is completed as a whole by performing the process to set a slitter/scorer for resetting the slitter/scorer for a next order in parallel with the process to deal with an order change over time, e.g. in a sheet fabrication system using one of the dual-type slitter/scorers for fabricating a sheet (cutting, folding) and the other for positioning and setting itself on standby while the first slitter/ scorer is doing the job.

SOLUTION: When one of slitter/scorers is lowered with the changing of an order in step S1, for example, in step S3, next order data is transferred to the slitter/scorer which is lowered in step Sa1, and further, data on the movement due to the resetting of an order is processed in parallel in step Sa2. In addition, the other slitter/scorer which is engaged in cutting the sheet is caused to ascend in step S6 and each of the fabricating parts of the slitter/scorer is set to next order data (positioning action) in step Sa3, based on the data processed as described. Then the required steps are taken, if the changing of a next order ensues in step S1.

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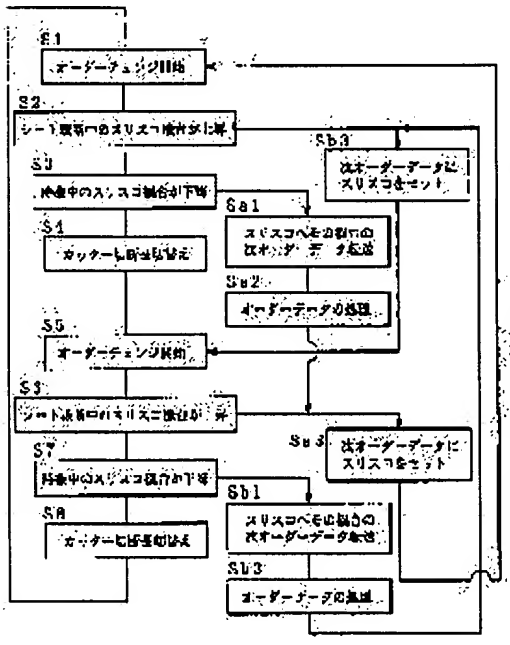
(54) ORDER CHANGE CONTROL DEVICE FOR SHEET FABRICATION SYSTEM



(57)Abstract:

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CLAIMS

[Claim(s)]

[Claim 1] Sheet processing equipments, such as a slitting machine, a scorekeeper, etc. who perform predetermined processing, sending sheets, such as a corrugated fiberboard sheet If it is positioned for processing of said sheet of predetermined order, the present order is processed to said sheet in the condition and there is a command of an order substitute In the sheet processing system into which positioning actuation according to the next order by the order substitute is carried out, and the next order is processed While being used for processing of said sheet processing equipment of said present order Supply the data for the own next order to the sheet processing equipment, and positioning actuation of the order of the degree concerned is prepared for it. The order substitute control unit of the sheet processing system characterized by performing positioning actuation for the next order after processing of the present order based on the data which have received said supply.

[Claim 2] A data supply means to supply the data for the own next order to the sheet processing equipment while being used for processing of said sheet processing equipment of said present order, A data-processing means to prepare positioning actuation for the next order of the sheet processing equipment concerned based on supply of the data, A storage means to memorize the result of the data processing, and a positioning operating-command means to make the positioning actuation for the next order of the sheet processing equipment concerned start after processing of said present order based on the content of storage of said storage means, The order substitute control unit of a sheet processing system given in ****** claim 1.
[Claim 3] Sheet processing equipments, such as a slitting machine, a scorekeeper, etc. who perform predetermined processing, sending sheets, such as a corrugated fiberboard sheet, are formed two or more sets in said sheet feed direction. While the thing of the group of the arbitration of two or more sets of the sheet processing equipments is processing the present order in the load location If the sheet processing equipment of other groups performs positioning actuation in an unload location for the next order, and stands by and there is an order substitute command It replaces that the sheet processing equipment of the group of said arbitration which was processing the present order shifts to an unload location from a load location. In the sheet processing system of the format of the sheet processing equipment of a group besides the above which has completed positioning actuation of the next order shifting to a load location from an unload location, and processing order of said degree When [said] two or more things of the arbitration of the sheet processing equipment of a group shift to a load location from said unload location, by the time processing in the load location is completed from from The data for the next order are beforehand supplied to the sheet processing equipment for the sheet processing equipment concerned. Positioning actuation for the next order of the sheet processing equipment is prepared. The order substitute control unit of the sheet processing system characterized by starting the positioning actuation for the next order for the sheet processing equipment concerned based on said data currently supplied after the sheet processing equipment starts or completes shift from a load location to an unload location.
[Claim 4] The order substitute control unit of the sheet processing system according to claim 3 by which the cutter cutting length of said cutter equipment is changed after said cutter equipment which cuts two or more said sheets after [said] passing through two or more sheet processing equipments of a group in a dimension predetermined in the feed direction at the downstream of said sheet feed direction of the sheet processing equipment of a group is formed and the change of said sheet processing equipment accompanying said order substitute is completed.
[Claim 5] When [said] two or more things of the arbitration of the sheet processing equipment of a group shift to a load location from said unload location, by the time processing in the load location is completed from from A data supply means to supply the data for the next order to the sheet processing equipment beforehand for the sheet processing equipment concerned, A data-processing means to prepare positioning actuation for the next order of the sheet processing equipment concerned based on supply of the data, After a storage means to memorize the result of the data processing, and said sheet processing equipment start or complete shift from a load location to an unload location The order substitute control unit of a sheet processing system including a positioning operating-command means to make the positioning actuation for the next order start for the sheet processing equipment concerned based on the content of storage of said storage means according to claim 3 or 4.
[Claim 6] It is the order substitute control unit of the sheet processing system according to claim 3 to 5 which is that for which is equipped with said slitting machine scorekeeper of ** the 1st by

which two or more sheet processing equipments of a group have been arranged at the predetermined spacing in the feed direction of said sheet, and the 2nd slitting machine scorekeeper, and these are used by turns in connection with said order substitute.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the equipment which controls an order substitute (for example, modification of a processing dimension) of such sheet processing especially about the sheet processing equipment into which predetermined processing (slitting machine), for example, decision, fold attachment (scorekeeper), etc. are processed, mainly sending sheets, such as a corrugated fiberboard sheet.
[0002]
[Description of the Prior Art] The slitting machine 24 which judges the corrugated fiberboard sheet DS along the feed direction with delivery to a longitudinal direction, and scorekeeper 24' which makes a crease along the feed direction are known so that it may be shown in the former (a), for example, drawing 8 . That in which a slitting machine 24 and scorekeeper 24' as shown in drawing 8 approach mutually, and form one unit is called a slitting machine scorekeeper (abbreviated-name SURISUKO). This example shows the example which picks three dishes by the sheet width of face S in the corrugated fiberboard sheet DS, and takes the trimming width of face t to ends, and makes a crease by the flap width of face F.
[0003] Here, in the so-called order substitute which changes the sheet width of face S which should be judged, for example, or changes the flap width of face F, as shown in this drawing (b), it will be made to move to shaft orientations with a servo motor etc., and a slitting machine 24 and scorekeeper 24' will be positioned.
[0004] While drawing 7 shows SURISUKO 1 of 2 ream type which approached the sheet flow direction and prepared 2 sets of above SURISUKO, and SURISUKO 2 and SURISUKO 1 is processing [for example,] the sheet (decision and fold attachment), for the next order substitute, SURISUKO 2 is positioned beforehand, and is standing by, and SURISUKO 2 starts sheet processing instead of SURISUKO 1 stopping in the case of an order substitute. Moreover, the corrugated fiberboard sheet DS after a cutter 25 is down-stream further and decision and fold attachment were carried out from these SURISUKO 1 and 2 is cut with a predetermined dimension at the feed direction and right angle.
[0005]
[Problem(s) to be Solved by the Invention] By the way, if the signal of an order substitute (order change) enters from the high order production-control equipment which is not illustrated, the set change of order will be performed in the following sequence. An above-mentioned order change signal is outputted by the order change start point of a sheet. This is this side rather than it approaches SURISUKO 1. Now, SURISUKO 1 is judging, and if SURISUKO 2 is waiting and an order change start point reaches the SURISUKO change over point of SURISUKO 1, SURISUKO 1 will go up and will stop decision of a sheet. And if an order change start point results in the SURISUKO change over point of SURISUKO 2, SURISUKO 2 will descend and decision of a sheet will be started. In addition, when the order change start point which passed through SURISUKO 2 comes to a cutter 25 after the above-mentioned change of SURISUKO was performed since the output timing of the order substitute signal in an order change start point

is set up so that it may finish taking the production number of sheets of the order currently produced by SURISUKO 1, cutter cutting length changes.
[0006] and the data (order [degree] data) of the next order to SURISUKO 1 waiting when a change of the cutting length (cutout dimension) of this cutter is completed -- delivery from high order production-control equipment -- data processing is carried out and a set is started.
[0007] If this flow is shown and an order change is started by Q1, drawing 11 will transmit order [degree] data by Q5, after passing through Q2, Q3, and Q4. This order [degree] data is data, such as the above-mentioned number of ** picking, sheet decision width of face, and flap width of face. And after SURISUKO 1 which went up, for example receives the order [degree] data, order data are processed by Q6. When the processing section (slitter scorer) of SURISUKO moves to shaft orientations with a servo motor etc., it computes it is necessary which to drive a servo motor to set up the dimension of the next order etc. Based on the data processing, each processing section of SURISUKO is actually moved to the location according to each dimension of order [degree] data etc. by Q7, and a set is completed now. If an order substitute signal enters again in the state of that set complete, this SURISUKO 1 will start decision etc. instead of SURISUKO 2 under processing.
[0008] Thus, in order to advance a sequence in order from order change initiation to the order [degree] set complete of SURISUKO, considerable time amount is required. For this reason, it is generated also when the time amount from an order change to an order change is brief when petty order (processing with little 1 time of production number of sheets) continues, and the following order set does not meet the deadline. That is, if its attention is paid to SURISUKO 1 as shown in the conventional example of drawing 9 (a) for example, SURISUKO 1 will enter during an order change for the order 2 from order 1 at sheet decision, and it will change from order 2 from decision to standby during the order change of order 3. Under the present circumstances, cutter cutting length changes to the cutting length 2 and a pan from the cutting length 1 to the cutting length 3. Although SURISUKO 1 goes up with an order change for the order 3 from order 2 and will be in a standby condition, a transfer is started for SURISUKO 1 only after a change of cutter cutting length completes order [degree] data. After receiving the data, data processing replaced with the amount of actuation of the above-mentioned servo motor etc. is performed. After it is completed, each processing section of SURISUKO is actually driven with a servo motor etc. to shaft orientations, and it will be in the condition that it can respond to the next order only after it is completed.
[0009] During this order change (under a transfer under + processing under + set), since the change set of order is not completed as close, the order substitute by the order 4 from order 3 cannot respond promptly at it. Since it was such, in the former, the production rate needed to be lowered, or production order die length per order (it can be said also as production-lot number of sheets) needed to be lengthened by force, or the order change needed to be performed as it was and the sheet which will be produced by the time the set of SURISUKO is completed needed to be used as the defective.
[0010] This invention makes it a technical problem not to reduce a production rate to the case of petty order, either, but to complete a set substitute of sheet processing equipments, such as SURISUKO, for a short time, and to remove constraint of production order length or a production rate, and to reduce the loss of the sheet on production.
[0011]
[Means for Solving the Problem] Although this invention is a thing as given in a claim, while using it for processing of the present order of sheet processing equipments, such as SURISUKO,

that main point supplies the data for the next order to that processing equipment for example, from production-control equipment etc., and prepares positioning actuation of the next order for it during that processing. And immediately after being in the condition in which positioning actuation of an order substitute is possible, it is in being made to perform actual positioning actuation for the following data based on the transfer data.

[0012] For example, in SURISUKO of 2 ream type, when SURISUKO 1 moves to a processing location (load location) from a position in readiness (unload location) in connection with an order substitute Transmit the data of the next order substitute, and if required, data processing, such as the amount of actuation of a location, will be performed. If there is the next order substitute command, and SURISUKO 1 will be in the condition in which a positioning set is possible from a load location after migration starting to an unload location, it will position so that it may correspond to the dimension of the next order substitute of each processing section of SURISUKO 1 immediately. That is, if the data of the next order are transmitted and the set of SURISUKO is attained after order change initiation while SURISUKO operates, it can be shortened by performing the set of an order change and SURISUKO independently and in juxtaposition, without waiting for a change of the cutting length of the above-mentioned cutter, so that most setting time of SURISUKO for the next order can be disregarded.

[0013] Even when petty order continues by this, the constraint to the production order length and production rate by SURISU cossette time amount increases, also when it can reduce or ignore. Therefore, even when it is not necessary to maintain a considerable early production rate and in the case of petty order, and production order length does not have to make it long because of a set substitute, either and it gives priority to an order change, the loss of the sheet used as the defective under order change decreases.

[0014] In addition, claim 1 and claim 2 are the cases where independent arrangement or two or more sets of arrangement are sufficient as sheet processing equipments, such as SURISUKO, and limit claim 3 and claim 5 to two or more sets of things, such as 2 etc. sets (2 ream type), on the upstream and the lower stream of a river of for example, a sheet feed direction. moreover, the supply (transfer) stage of the data for the next order -- substantial -- sheet processing equipments, such as SURISUKO, -- a standby condition -- de-- when early and migration is started from an unload location to a load location that what is necessary is just a condition the bottom, when late, just before processing of decision etc. is completed, it can set up. Moreover, in SURISUKO, such as for example, 2 ream type, when shift is completed from a load location to an unload location, it can start, but from a front [it], i.e., a load location, to an unload location, the stage to start actual positioning actuation based on such transmitted data can also be started from the event, if positioning actuation actual during shift is possible.

[0015]

[Embodiment of the Invention] The gestalt of operation of this invention is explained referring to the example shown in a drawing hereafter. In addition, although the slitting machine scorekeeper who put the slitting machine and the scorekeeper side by side to the serial is taken for an example in the example shown in a drawing, you may be a slitting machine independent machine or a scorekeeper independent machine, and general-purpose sheet processing equipment that performs decision of a corrugated fiberboard sheet, and processing of those other than fold attachment further on application of this invention.

[0016] In drawing 1 , along with the pass line PL of the corrugated fiberboard sheet (only henceforth a sheet) DS, contiguity arrangement is carried out and two sets (SURISUKO) of the slitting machine scorekeepers 1 and 2 are used by turns for the sheet feed direction by the serial.

The scorekeeper 3 and the slitting machine 4 adjoined the serial in the sheet feed direction, and SURISUKO 1 serves as a unit of a bundle [this]. The same is said of SURISUKO 2, and a scorekeeper's 5 lower stream of a river is adjoined, a slitting machine 6 is arranged, and the cutter 25 of above-mentioned drawing 7 exists in the lower stream of a river of this SURISUKO 2. Scorekeepers 3 and 5 make the crease (it is parallel to a feed direction) which met the feed direction by the scorekeeper discs 10 and 12 at Sheet DS, and judge slitting machines 4 and 6 on both sides of Sheet DS to a feed direction with the up-and-down slitting machine cutting edges 20 and 22.

[0017] By the way, a slitting machine 4 or 6 is judged like drawing 5 (a), and a scorekeeper 3 or 5 carries out fold attachment, as shown in this drawing (b), but on application of this invention, since it is the configuration same about the migration device of the sheet cross direction of each processing unit, it is typically shown in drawing 2 in more detail about a slitting machine 6. The slitting machine 6 was equipped with the disc-like slitting machine cutting edges 20 and 22 which are up-and-down relation and rotate mutually in an opposite direction on both sides of the pass line PL of the corrugated fiberboard sheet DS, and these equip nothing with the subject of the slitting machine unit 24 (processing unit), and are equipped with two or more sets (for example, 5 sets) of this slitting machine unit 24 crosswise [of Sheet DS] (refer to drawing 3). And by supplying Sheet DS among each slitting machine cutting edges 20 and 22, the sheet DS is cut so that it may insert along a feed direction. Moreover, the slitting machine cutting edges 20 and 22 of each slitting machine unit 24 are constituted movable between the load location (processing location) which cuts Sheet DS, and the unload location (non-processed location) estranged from the sheet DS. Moreover, each slitting machine unit 24 is arranged crosswise [sheet] free [migration to mutual], and positioning adjustment is carried out according to modification of the number of ** picking by order modification, ** picking width of face, etc.

[0018] that is, in drawing 3 , the pass line PL of Sheet DS is inserted among the frames 26 and 26 of a slitting machine 6 -- as -- the vertical direction -- predetermined spacing -- it is and parallel are built over the beams 28 and 30 (refer to drawing 2) of a couple. And the migration member 36 of the same number as the slitting machine cutting edge 20 is supported possible [sliding] through the guide rails 34 and 34 of a couple by the upper beam 28. The nut (36a of drawing 4) prepared in this migration member 36 free [a revolution] is screwing in both the frames 26 and 26 at the screw shaft 38 constructed and fixed. And by driving each servo motor 40 as an individual actuator formed in each migration member 36, revolution actuation of the nut 36a is carried out by engagement with gear 36b formed in gear 40a and nut 36a by the side of the motor, and each migration member 36, as a result two or more slitting machine cutting edges 20 are horizontally moved and positioned by this according to an individual, respectively.

[0019] The holder 44 is formed in the migration member 36 bottom rotatable in the fixed include-angle range by drawing 2 by using as the supporting point horizontal shaft 44a over which it was built between a frame 26 and 26. Although this shaft 44a does not carry out a detailed graphic display, it is a driving shaft for rotating two or more slitting machine cutting edges 20 all at once. A holder 44 is connected with piston rod 46a of a cylinder 46, and a holder 44, as a result the slitting machine cutting edge 20 rotate it by expanding of this cylinder 46 to the unload location evacuated from the load location which cuts out Sheet DS to the upper part.

[0020] Although it is prepared also in the beam 30 of the above-mentioned bottom with the configuration in which the same migration member 36 as an upside becomes symmetrical up and down and evacuates from a load location to it in a cylinder 46 in a downward unload location about the lower slitting machine cutting edge 22 as well as the upper slitting machine cutting

edge 20, the sign which corresponds since it is the same configuration as an upside functionally is attached, and explanation is omitted. In addition, the trimming piece which is a decision piece of both the sides of Sheet DS is attracted and recovered by the attraction duct.
[0021] Next, the block diagram of a control system is explained based on drawing 6 . High order production-control equipment 60 manages and controls production of the whole colgater line which performs decision etc., the data of production order, such as a location of a scorekeeper's fold line, are stored further, and the signal is transmitted to number of ** picking and ** picking width of face of a slitting machine or a scorekeeper (SURISUKO), and target SURISUKO in the case of an order substitute (order change). Moreover, when a change in the load location or unload location of SURISUKO completes the load unload detection sensor 61, it is a sensor for outputting a load signal or an unload signal, and in response to a load signal, order [degree] data are transmitted to the SURISUKO concerned, and a actual set (positioning actuation) is started in response to an unload signal.
[0022] The high order production-control equipment 60 of drawing 6 and the load unload detection sensor 61 are connected to the computer 71 through I/O Port 70. A computer 71 is the thing equipped with CPU72, ROM73, and RAM74, and a required program besides sequence program 73a for order substitute control is stored in ROM73. Moreover, while memorizing temporarily the order [degree] data transmitted to SURISUKO, the required memory area besides work-piece memory 74a which memorizes temporarily the data of the amount of servo motor actuation calculated based on it (data processing) etc. is assigned to RAM74.
[0023] Furthermore, each above-mentioned servo motor 40 (SM1-SMn) is controlled by the command from CPU72 through the servo motor positioning units (driver) U1-Un. As a rotation detector for checking the rotation of these servo motors SM1-SMn, pulse generators PG1-PGn are attached to each servo motor 40, and the engine-speed pulse is fed back to the servo motor positioning units U1-Un. Moreover, the load unload solenoid valve 75 for moving the slitter scorer of SURISUKO etc. to a load location and an unload location drives to predetermined timing by CPU72, and, thereby, the above-mentioned cylinder 46 expands and contracts.
[0024] As mentioned above, although the slitting machine 6 of drawing 1 was mainly explained, it has the individual actuator of a scorekeeper 5 and the still more nearly same servo motor 40 grade as the above also about another slitting machine scorekeeper's 1 slitting machine 4, or a scorekeeper 3.
[0025] Next, an example of the control which makes order substitute control a subject is explained based on drawing 9 and drawing 10 . Now, SURISUKO 1 of drawing 7 is waiting and it is assumed that it is that into which the signal of an order substitute (order change) was inputted from the high order production-control equipment 60 of drawing 6 in the condition that SURISUKO 2 is carrying out sheet processing (decision and fold attachment). As shown in drawing, if the signal of this order change is outputted in the specified quantity this side which the present order number of sheets ends like drawing 7 and that order change start point results in SURISUKO 1, SURISUKO 1 will descend to a load location, and if an order change start point results in SURISUKO 2, that SURISUKO 2 will go up to an unload location. When SURISUKO 1 is sheet processing reverse and an order change is performed from the condition that SURISUKO 2 is waiting, with this, SURISUKO 1 will tell [SURISUKO 2] descent to lifting and a pan by arrival of an order change start point. Anyway, after SURISUKO 1 and 2 changes, a cutter 25 changes cutter cutting length on the lower stream of a river for the next order.
[0026] If this is seen by drawing 10 , S2 and S3 will become the cutter cutting length change of S4 from order change initiation of S1 after that, although sequence may interchange. And a

check of that the machine stool (only henceforth SURISUKO 1) of waiting SURISUKO 1 descended, for example by S3, and SURISUKO 1 descended to the load location by the load unload detection sensor 61 of drawing 6 transmits order [degree] data to SURISUKO 1 changed from the high order production-control equipment 60 of drawing 6 to the load location (Sa1). In the SURISUKO 1 side which receives this, it calculates which must move respectively each servo motors SM1-SMn to work-piece memory 74a of RAM74 by memorizing this temporarily according to dimension modification of the number of ** picking based on order [degree] data, sheet width of face, flap width of face, trimming width of face, etc. further, for example. This data processing corresponds to Sa2 of drawing 10 . Data, such as the amount of servo motor actuation by which data processing was carried out, are also temporarily stored in work-piece memory 74a.

[0027] And the next order change is further started by S5, the machine stool of SURISUKO 1 under the sheet decision goes up by S6, and if having shifted to the unload location by the load unload detection sensor 61 of drawing 6 is checked, in order to set each of that machine stool (each slitting machine and scorekeeper) of SURISUKO 1 that went up to spacing corresponding to order [degree] data by Sa3, each servo motor 40 is driven. The amount of actuation of each servo motor 40 is based on the data temporarily memorized by work-piece memory 74a etc. by the above-mentioned data processing, and by actuation of each servo motor 40, it is the device shown in drawing 4 , and each slitting machine unit 24 grade moves to shaft orientations, and equips the next order with it.

[0028] Like above-mentioned Sa1-above-mentioned Sa3, if lifting of SURISUKO 1 of S6 is replaced and SURISUKO 2 of S7 descends, order [degree] data will be transmitted to the SURISUKO 2 which descended by Sb1. Moreover, by Sb2 When operations (data processing) based on the data, such as the amount of servo motor actuation, are performed and SURISUKO 2 under the sheet decision goes up by S2, the set (positioning actuation by the servo motor 40) of SURISUKO 2 for degree order is performed by Sb3.

[0029] Thus, order [degree] data are transmitted to SURISUKO which starts sheet processing with an order change, without waiting for a change of cutter cutting length. And if that data processing is carried out, it stands by and this SURISUKO goes up, parallel processing, i.e., S1 - S4, of starting positioning actuation promptly, flow of an order change of S5-S8, and flow of the SURISU cossette of Sa1-Sa3, and Sb1-Sb3 will be performed in juxtaposition.

[0030] Drawing 9 (b) shows this situation by the timing diagram, and if No.1 machine stool (SURISUKO 1) of SURISUKO is waiting, for example, the order change signal changed to order 2 from order 1 enters, SURISUKO 1 will descend and it will start sheet decision. At this time, order [degree] data (in this case, it is data of order 3 and becomes order data one after another for a production line) are transmitted to SURISUKO 1 for self, and data processing for positioning actuation is performed based on that data. And if the order change signal to the order 3 from order 2 enters, SURISUKO 1 will go up, but if the lifting is completed, positioning actuation for order 3 (set) will be performed. And if the set is completed and it descends promptly, also when enough for an order change for order 3, it will increase.

[0031] The travel speed of a actual sheet is a part (several m/s) for 200-400m/, since it is effective when working in this way at high speed raises productive efficiency, is putting into the next order from petty order, without reducing a production rate, and can do the loss of the sheet at the time of a change with the minimum.

[0032] As for conventional drawing 9 (a), the order change signal to the order 2 from order 1 enters. Since it is the data transfer to SURISUKO, its data processing, and the thing that sets

SURISUKO with a series system further after the cutting length 1 in a cutter is changed to the cutting length 2, Although a considerable sheet loss will arise since it cannot respond to the next order change (order 4) if it is not after passing through data transfer time + data-processing time amount + setting time after changing from the cutting length 2 to the cutting length 3 In (b), if SURISU cossette is completed before changing to the cutting length 3 from the cutting length 2, an order change for order 3 will be attained without the loss of a parenchyma top sheet.
[0033] That is, in drawing 7 , about t2 and SURISU cossette time amount, t3, then the need time amount from an order change to order [degree] set complete are as follows in L and a sheet rate about the order [degree] data transfer time from V and production-control equipment to SURISUKO, and are [distance / from an order change start point to a cutter cutting length change over point] as follows in t1 and the data-processing time amount of SURISUKO. [of time amount]
(L/V) +t1+t2+t3[0034] On the other hand, in this invention, when distance from the SURISUKO change over point in drawing 7 to a cutter cutting length change over point is set to a or b, the time amount from order change initiation to the set complete of SURISUKO is as follows.
{(L-a (or b)) /V}+t2+t3 -- in addition, the minimum time amount from an order change to order [degree] set complete serves as L/V. If the following order set complete is carried out into this time amount, an order substitute of a short lot can also be coped with promptly.

TECHNICAL FIELD

[Field of the Invention] This invention relates to the equipment which controls an order substitute (for example, modification of a processing dimension) of such sheet processing especially about the sheet processing equipment into which predetermined processing (slitting machine), for example, decision, fold attachment (scorekeeper), etc. are processed, mainly sending sheets, such as a corrugated fiberboard sheet.

PRIOR ART

[Description of the Prior Art] The slitting machine 24 which judges the corrugated fiberboard sheet DS along the feed direction with delivery to a longitudinal direction, and scorekeeper 24' which makes a crease along the feed direction are known so that it may be shown in the former (a), for example, drawing 8 . That in which a slitting machine 24 and scorekeeper 24' as shown in drawing 8 approach mutually, and form one unit is called a slitting machine scorekeeper (abbreviated-name SURISUKO). This example shows the example which picks three dishes by the sheet width of face S in the corrugated fiberboard sheet DS, and takes the trimming width of face t to ends, and makes a crease by the flap width of face F.
[0003] Here, in the so-called order substitute which changes the sheet width of face S which should be judged, for example, or changes the flap width of face F, as shown in this drawing (b), it will be made to move to shaft orientations with a servo motor etc., and a slitting machine 24 and scorekeeper 24' will be positioned.
[0004] While drawing 7 shows SURISUKO 1 of 2 ream type which approached the sheet flow direction and prepared 2 sets of above SURISUKO, and SURISUKO 2 and SURISUKO 1 is processing [for example,] the sheet (decision and fold attachment), for the next order substitute, SURISUKO 2 is positioned beforehand, and is standing by, and SURISUKO 2 starts sheet processing instead of SURISUKO 1 stopping in the case of an order substitute. Moreover, the

corrugated fiberboard sheet DS after a cutter 25 is down-stream further and decision and fold attachment were carried out from these SURISUKO 1 and 2 is cut with a predetermined dimension at the feed direction and right angle.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] By the way, if the signal of an order substitute (order change) enters from the high order production-control equipment which is not illustrated, the set change of order will be performed in the following sequence. An above-mentioned order change signal is outputted by the order change start point of a sheet. This is this side rather than it approaches SURISUKO 1. Now, SURISUKO 1 is judging, and if SURISUKO 2 is waiting and an order change start point reaches the SURISUKO change over point of SURISUKO 1, SURISUKO 1 will go up and will stop decision of a sheet. And if an order change start point results in the SURISUKO change over point of SURISUKO 2, SURISUKO 2 will descend and decision of a sheet will be started. In addition, when the order change start point which passed through SURISUKO 2 comes to a cutter 25 after the above-mentioned change of SURISUKO was performed since the output timing of the order substitute signal in an order change start point is set up so that it may finish taking the production number of sheets of the order currently produced by SURISUKO 1, cutter cutting length changes.

[0006] and the data (order [degree] data) of the next order to SURISUKO 1 waiting when a change of the cutting length (cutout dimension) of this cutter is completed -- delivery from high order production-control equipment -- data processing is carried out and a set is started.

[0007] If this flow is shown and an order change is started by Q1, drawing 11 will transmit order [degree] data by Q5, after passing through Q2, Q3, and Q4. This order [degree] data is data, such as the above-mentioned number of ** picking, sheet decision width of face, and flap width of face. And after SURISUKO 1 which went up, for example receives the order [degree] data, order data are processed by Q6. When the processing section (slitter scorer) of SURISUKO moves to shaft orientations with a servo motor etc., it computes it is necessary which to drive a servo motor to set up the dimension of the next order etc. Based on the data processing, each processing section of SURISUKO is actually moved to the location according to each dimension of order [degree] data etc. by Q7, and a set is completed now. If an order substitute signal enters again in the state of that set complete, this SURISUKO 1 will start decision etc. instead of SURISUKO 2 under processing.

[0008] Thus, in order to advance a sequence in order from order change initiation to the order [degree] set complete of SURISUKO, considerable time amount is required. For this reason, it is generated also when the time amount from an order change to an order change is brief when petty order (processing with little 1 time of production number of sheets) continues, and the following order set does not meet the deadline. That is, if its attention is paid to SURISUKO 1 as shown in the conventional example of drawing 9 (a) for example, SURISUKO 1 will enter during an order change for the order 2 from order 1 at sheet decision, and it will change from order 2 from decision to standby during the order change of order 3. Under the present circumstances, cutter cutting length changes to the cutting length 2 and a pan from the cutting length 1 to the cutting length 3. Although SURISUKO 1 goes up with an order change for the order 3 from order 2 and will be in a standby condition, a transfer is started for SURISUKO 1 only after a change of cutter cutting length completes order [degree] data. After receiving the data, data processing replaced with the amount of actuation of the above-mentioned servo motor

etc. is performed. After it is completed, each processing section of SURISUKO is actually driven with a servo motor etc. to shaft orientations, and it will be in the condition that it can respond to the next order only after it is completed.
[0009] During this order change (under a transfer under + processing under + set), since the change set of order is not completed as close, the order substitute by the order 4 from order 3 cannot respond promptly at it. Since it was such, in the former, the production rate needed to be lowered, or production order die length per order (it can be said also as production-lot number of sheets) needed to be lengthened by force, or the order change needed to be performed as it was and the sheet which will be produced by the time the set of SURISUKO is completed needed to be used as the defective.
[0010] This invention makes it a technical problem not to reduce a production rate to the case of petty order, either, but to complete a set substitute of sheet processing equipments, such as SURISUKO, for a short time, and to remove constraint of production order length or a production rate, and to reduce the loss of the sheet on production.

MEANS

[Means for Solving the Problem] Although this invention is a thing as given in a claim, while using it for processing of the present order of sheet processing equipments, such as SURISUKO, that main point supplies the data for the next order to that processing equipment for example, from production-control equipment etc., and prepares positioning actuation of the next order for it during that processing. And immediately after being in the condition in which positioning actuation of an order substitute is possible, it is in being made to perform actual positioning actuation for the following data based on the transfer data.
[0012] For example, in SURISUKO of 2 ream type, when SURISUKO 1 moves to a processing location (load location) from a position in readiness (unload location) in connection with an order substitute Transmit the data of the next order substitute, and if required, data processing, such as the amount of actuation of a location, will be performed. If there is the next order substitute command, and SURISUKO 1 will be in the condition in which a positioning set is possible from a load location after migration starting to an unload location, it will position so that it may correspond to the dimension of the next order substitute of each processing section of SURISUKO 1 immediately. That is, if the data of the next order are transmitted and the set of SURISUKO is attained after order change initiation while SURISUKO operates, it can be shortened by performing the set of an order change and SURISUKO independently and in juxtaposition, without waiting for a change of the cutting length of the above-mentioned cutter, so that most setting time of SURISUKO for the next order can be disregarded.
[0013] Even when petty order continues by this, the constraint to the production order length and production rate by SURISU cossette time amount increases, also when it can reduce or ignore. Therefore, even when it is not necessary to maintain a considerable early production rate and in the case of petty order, and production order length does not have to make it long because of a set substitute, either and it gives priority to an order change, the loss of the sheet used as the defective under order change decreases.
[0014] In addition, claim 1 and claim 2 are the cases where independent arrangement or two or more sets of arrangement are sufficient as sheet processing equipments, such as SURISUKO, and limit claim 3 and claim 5 to two or more sets of things, such as 2 etc. sets (2 ream type), on the upstream and the lower stream of a river of for example, a sheet feed direction. moreover, the

supply (transfer) stage of the data for the next order -- substantial -- sheet processing equipments, such as SURISUKO, -- a standby condition -- de-- when early and migration is started from an unload location to a load location that what is necessary is just a condition the bottom, when late, just before processing of decision etc. is completed, it can set up. Moreover, in SURISUKO, such as for example, 2 ream type, when shift is completed from a load location to an unload location, it can start, but from a front [it], i.e., a load location, to an unload location, the stage to start actual positioning actuation based on such transmitted data can also be started from the event, if positioning actuation actual during shift is possible.

[0015]

[Embodiment of the Invention] The gestalt of operation of this invention is explained referring to the example shown in a drawing hereafter. In addition, although the slitting machine scorekeeper who put the slitting machine and the scorekeeper side by side to the serial is taken for an example in the example shown in a drawing, you may be a slitting machine independent machine or a scorekeeper independent machine, and general-purpose sheet processing equipment that performs decision of a corrugated fiberboard sheet, and processing of those other than fold attachment further on application of this invention.

[0016] In drawing 1 , along with the pass line PL of the corrugated fiberboard sheet (only henceforth a sheet) DS, contiguity arrangement is carried out and two sets (SURISUKO) of the slitting machine scorekeepers 1 and 2 are used by turns for the sheet feed direction by the serial. The scorekeeper 3 and the slitting machine 4 adjoined the serial in the sheet feed direction, and SURISUKO 1 serves as a unit of a bundle [this]. The same is said of SURISUKO 2, and a scorekeeper's 5 lower stream of a river is adjoined, a slitting machine 6 is arranged, and the cutter 25 of above-mentioned drawing 7 exists in the lower stream of a river of this SURISUKO 2. Scorekeepers 3 and 5 make the crease (it is parallel to a feed direction) which met the feed direction by the scorekeeper discs 10 and 12 at Sheet DS, and judge slitting machines 4 and 6 on both sides of Sheet DS to a feed direction with the up-and-down slitting machine cutting edges 20 and 22.

[0017] By the way, a slitting machine 4 or 6 is judged like drawing 5 (a), and a scorekeeper 3 or 5 carries out fold attachment, as shown in this drawing (b), but on application of this invention, since it is the configuration same about the migration device of the sheet cross direction of each processing unit, it is typically shown in drawing 2 in more detail about a slitting machine 6. The slitting machine 6 was equipped with the disc-like slitting machine cutting edges 20 and 22 which are up-and-down relation and rotate mutually in an opposite direction on both sides of the pass line PL of the corrugated fiberboard sheet DS, and these equip nothing with the subject of the slitting machine unit 24 (processing unit), and are equipped with two or more sets (for example, 5 sets) of this slitting machine unit 24 crosswise [of Sheet DS] (refer to drawing 3). And by supplying Sheet DS among each slitting machine cutting edges 20 and 22, the sheet DS is cut so that it may insert along a feed direction. Moreover, the slitting machine cutting edges 20 and 22 of each slitting machine unit 24 are constituted movable between the load location (processing location) which cuts Sheet DS, and the unload location (non-processed location) estranged from the sheet DS. Moreover, each slitting machine unit 24 is arranged crosswise [sheet] free [migration to mutual], and positioning adjustment is carried out according to modification of the number of ** picking by order modification, ** picking width of face, etc.

[0018] that is, in drawing 3 , the pass line PL of Sheet DS is inserted among the frames 26 and 26 of a slitting machine 6 -- as -- the vertical direction -- predetermined spacing -- it is and parallel are built over the beams 28 and 30 (refer to drawing 2) of a couple. And the migration

member 36 of the same number as the slitting machine cutting edge 20 is supported possible [sliding] through the guide rails 34 and 34 of a couple by the upper beam 28. The nut (36a of drawing 4) prepared in this migration member 36 free [a revolution] is screwing in both the frames 26 and 26 at the screw shaft 38 constructed and fixed. And by driving each servo motor 40 as an individual actuator formed in each migration member 36, revolution actuation of the nut 36a is carried out by engagement with gear 36b formed in gear 40a and nut 36a by the side of the motor, and each migration member 36, as a result two or more slitting machine cutting edges 20 are horizontally moved and positioned by this according to an individual, respectively.

[0019] The holder 44 is formed in the migration member 36 bottom rotatable in the fixed include-angle range by drawing 2 by using as the supporting point horizontal shaft 44a over which it was built between a frame 26 and 26. Although this shaft 44a does not carry out a detailed graphic display, it is a driving shaft for rotating two or more slitting machine cutting edges 20 all at once. A holder 44 is connected with piston rod 46a of a cylinder 46, and a holder 44, as a result the slitting machine cutting edge 20 rotate it by expanding of this cylinder 46 to the unload location evacuated from the load location which cuts out Sheet DS to the upper part.

[0020] Although it is prepared also in the beam 30 of the above-mentioned bottom with the configuration in which the same migration member 36 as an upside becomes symmetrical up and down and evacuates from a load location to it in a cylinder 46 in a downward unload location about the lower slitting machine cutting edge 22 as well as the upper slitting machine cutting edge 20, the sign which corresponds since it is the same configuration as an upside functionally is attached, and explanation is omitted. In addition, the trimming piece which is a decision piece of both the sides of Sheet DS is attracted and recovered by the attraction duct.

[0021] Next, the block diagram of a control system is explained based on drawing 6 . High order production-control equipment 60 manages and controls production of the whole colgater line which performs decision etc., the data of production order, such as a location of a scorekeeper's fold line, are stored further, and the signal is transmitted to number of ** picking and ** picking width of face of a slitting machine or a scorekeeper (SURISUKO), and target SURISUKO in the case of an order substitute (order change). Moreover, when a change in the load location or unload location of SURISUKO completes the load unload detection sensor 61, it is a sensor for outputting a load signal or an unload signal, and in response to a load signal, order [degree] data are transmitted to the SURISUKO concerned, and a actual set (positioning actuation) is started in response to an unload signal.

[0022] The high order production-control equipment 60 of drawing 6 and the load unload detection sensor 61 are connected to the computer 71 through I/O Port 70. A computer 71 is the thing equipped with CPU72, ROM73, and RAM74, and a required program besides sequence program 73a for order substitute control is stored in ROM73. Moreover, while memorizing temporarily the order [degree] data transmitted to SURISUKO, the required memory area besides work-piece memory 74a which memorizes temporarily the data of the amount of servo motor actuation calculated based on it (data processing) etc. is assigned to RAM74.

[0023] Furthermore, each above-mentioned servo motor 40 (SM1-SMn) is controlled by the command from CPU72 through the servo motor positioning units (driver) U1-Un. As a rotation detector for checking the rotation of these servo motors SM1-SMn, pulse generators PG1-PGn are attached to each servo motor 40, and the engine-speed pulse is fed back to the servo motor positioning units U1-Un. Moreover, the load unload solenoid valve 75 for moving the slitter scorer of SURISUKO etc. to a load location and an unload location drives to predetermined timing by CPU72, and, thereby, the above-mentioned cylinder 46 expands and contracts.

[0024] As mentioned above, although the slitting machine 6 of drawing 1 was mainly explained, it has the individual actuator of a scorekeeper 5 and the still more nearly same servo motor 40 grade as the above also about another slitting machine scorekeeper's 1 slitting machine 4, or a scorekeeper 3.
[0025] Next, an example of the control which makes order substitute control a subject is explained based on drawing 9 and drawing 10 . Now, SURISUKO 1 of drawing 7 is waiting and it is assumed that it is that into which the signal of an order substitute (order change) was inputted from the high order production-control equipment 60 of drawing 6 in the condition that SURISUKO 2 is carrying out sheet processing (decision and fold attachment). As shown in drawing, if the signal of this order change is outputted in the specified quantity this side which the present order number of sheets ends like drawing 7 and that order change start point results in SURISUKO 1, SURISUKO 1 will descend to a load location, and if an order change start point results in SURISUKO 2, that SURISUKO 2 will go up to an unload location. When SURISUKO 1 is sheet processing reverse and an order change is performed from the condition that SURISUKO 2 is waiting, with this, SURISUKO 1 will tell [SURISUKO 2] descent to lifting and a pan by arrival of an order change start point. Anyway, after SURISUKO 1 and 2 changes, a cutter 25 changes cutter cutting length on the lower stream of a river for the next order.
[0026] If this is seen by drawing 10 , S2 and S3 will become the cutter cutting length change of S4 from order change initiation of S1 after that, although sequence may interchange. And a check of that the machine stool (only henceforth SURISUKO 1) of waiting SURISUKO 1 descended, for example by S3, and SURISUKO 1 descended to the load location by the load unload detection sensor 61 of drawing 6 transmits order [degree] data to SURISUKO 1 changed from the high order production-control equipment 60 of drawing 6 to the load location (Sa1). In the SURISUKO 1 side which receives this, it calculates which must move respectively each servo motors SM1-SMn to work-piece memory 74a of RAM74 by memorizing this temporarily according to dimension modification of the number of ** picking based on order [degree] data, sheet width of face, flap width of face, trimming width of face, etc. further, for example. This data processing corresponds to Sa2 of drawing 10 . Data, such as the amount of servo motor actuation by which data processing was carried out, are also temporarily stored in work-piece memory 74a.
[0027] And the next order change is further started by S5, the machine stool of SURISUKO 1 under the sheet decision goes up by S6, and if having shifted to the unload location by the load unload detection sensor 61 of drawing 6 is checked, in order to set each of that machine stool (each slitting machine and scorekeeper) of SURISUKO 1 that went up to spacing corresponding to order [degree] data by Sa3, each servo motor 40 is driven. The amount of actuation of each servo motor 40 is based on the data temporarily memorized by work-piece memory 74a etc. by the above-mentioned data processing, and by actuation of each servo motor 40, it is the device shown in drawing 4 , and each slitting machine unit 24 grade moves to shaft orientations, and equips the next order with it.
[0028] Like above-mentioned Sa1-above-mentioned Sa3, if lifting of SURISUKO 1 of S6 is replaced and SURISUKO 2 of S7 descends, order [degree] data will be transmitted to the SURISUKO 2 which descended by Sb1. Moreover, by Sb2 When operations (data processing) based on the data, such as the amount of servo motor actuation, are performed and SURISUKO 2 under the sheet decision goes up by S2, the set (positioning actuation by the servo motor 40) of SURISUKO 2 for degree order is performed by Sb3.
[0029] Thus, order [degree] data are transmitted to SURISUKO which starts sheet processing

with an order change, without waiting for a change of cutter cutting length. And if that data processing is carried out, it stands by and this SURISUKO goes up, parallel processing, i.e., S1 - S4, of starting positioning actuation promptly, flow of an order change of S5-S8, and flow of the SURISU cossette of Sa1-Sa3, and Sb1-Sb3 will be performed in juxtaposition.
[0030] Drawing 9 (b) shows this situation by the timing diagram, and if No.1 machine stool (SURISUKO 1) of SURISUKO is waiting, for example, the order change signal changed to order 2 from order 1 enters, SURISUKO 1 will descend and it will start sheet decision. At this time, order [degree] data (in this case, it is data of order 3 and becomes order data one after another for a production line) are transmitted to SURISUKO 1 for self, and data processing for positioning actuation is performed based on that data. And if the order change signal to the order 3 from order 2 enters, SURISUKO 1 will go up, but if the lifting is completed, positioning actuation for order 3 (set) will be performed. And if the set is completed and it descends promptly, also when enough for an order change for order 3, it will increase.
[0031] The travel speed of a actual sheet is a part (several m/s) for 200-400m/, since it is effective when working in this way at high speed raises productive efficiency, is putting into the next order from petty order, without reducing a production rate, and can do the loss of the sheet at the time of a change with the minimum.
[0032] As for conventional drawing 9 (a), the order change signal to the order 2 from order 1 enters. Since it is the data transfer to SURISUKO, its data processing, and the thing that sets SURISUKO with a series system further after the cutting length 1 in a cutter is changed to the cutting length 2, Although a considerable sheet loss will arise since it cannot respond to the next order change (order 4) if it is not after passing through data transfer time + data-processing time amount + setting time after changing from the cutting length 2 to the cutting length 3 In (b), if SURISU cossette is completed before changing to the cutting length 3 from the cutting length 2, an order change for order 3 will be attained without the loss of a parenchyma top sheet.
[0033] That is, in drawing 7 , about t2 and SURISU cossette time amount, t3, then the need time amount from an order change to order [degree] set complete are as follows in L and a sheet rate about the order [degree] data transfer time from V and production-control equipment to SURISUKO, and are [distance / from an order change start point to a cutter cutting length change over point] as follows in t1 and the data-processing time amount of SURISUKO. [of time amount]
(L/V) +t1+t2+t3[0034] On the other hand, in this invention, when distance from the SURISUKO change over point in drawing 7 to a cutter cutting length change over point is set to a or b, the time amount from order change initiation to the set complete of SURISUKO is as follows.
{(L-a (or b)) /V}+t2+t3 -- in addition, the minimum time amount from an order change to order [degree] set complete serves as L/V. If the following order set complete is carried out into this time amount, an order substitute of a short lot can also be coped with promptly.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] Drawing showing notionally the slitting machine scorekeeper (SURISUKO) of 2 ream type structure.
[Drawing 2] The front view taking out and showing the part of the slitting machine unit of drawing 1 .
[Drawing 3] The side elevation.

[Drawing 4] The front view showing an example of the individual actuator which positions and moves each processing unit.
[Drawing 5] Drawing showing the body of a slitting machine unit and a scorekeeper unit.
[Drawing 6] The block diagram showing an example of a control system.
[Drawing 7] Drawing showing typically the array relation between SURISUKO of 2 ream type, and a cutter.
[Drawing 8] Drawing explaining arrangement and positioning of each slitting machine of SURISUKO and a scorekeeper.
[Drawing 9] The timing diagram which shows an example of order substitute control of this invention as compared with the conventional example.
[Drawing 10] The flow chart which shows an example of order substitute control of this invention.
[Drawing 11] The flow chart which shows the flow of an order substitute of the conventional example.
[Description of Notations]
1 Two Slitting machine scorekeeper (SURISUKO)
3 Five Scorekeeper
4 Six Slitting machine
10 12 Scorekeeper disc
20 22 Slitting machine cutting edge
36 Migration Member
38 Screw Shaft
40 Servo Motor (Individual Actuator)
60 High Order Production-Control Equipment
61 Load Unload Detection Sensor

[Translation done.]

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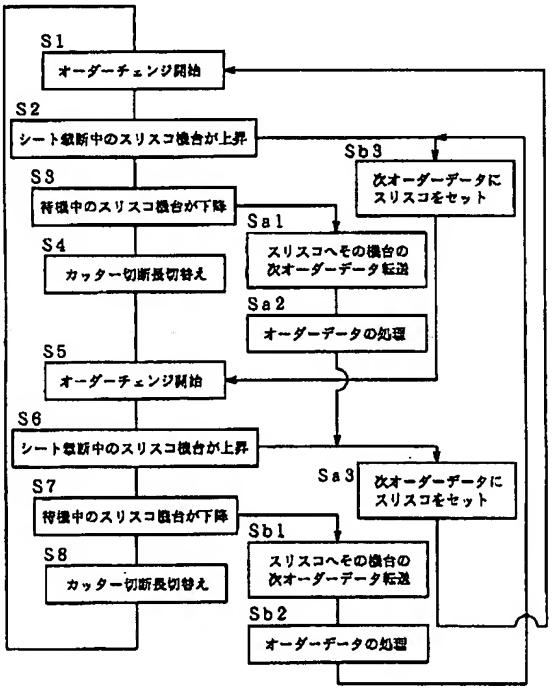
(54)【発明の名称】　シート加工システムのオーダー替え制御装置

(57)【要約】

【課題】　例えば２連式のスリッタスコアラ（スリスコ）の一方がシート加工（裁断・折り目付け等）をしている間に、他方のスリスコが次のオーダーのための位置決めをして待機する方式のものにおいて、オーダーチェンジの経時的な流れと、スリスコを次オーダーのためにセットし直すスリスコセットの流れとを並列的に行い、全体としてオーダーセットが完了するまでの時間を最小限とする。

【解決手段】　Ｓ１のオーダーチェンジに伴い、例えばＳ３で一方のスリスコ機台が下降したら、Ｓａ１でその下降したスリスコへ次オーダーデータを転送し、さらにＳａ２でセット替えの移動量等のデータ処理を並列して行っておき、Ｓ６でそのシート裁断中のスリスコが上昇したら、上記データ処理をしたデータに基づいてＳａ３でスリスコの各加工部を次オーダーデータにセット（位置決め動作）する。そしてＳ１で次のオーダーチェンジがあれば、それにすぐ対処する。



【特許請求の範囲】

【請求項１】　段ボールシート等のシートを送りつつ所定の加工を行うスリッタ及び／又はスコアラ等のシート加工装置が、前記シートの所定のオーダーの加工のために位置決めされ、その状態で前記シートに対して現行オーダーの加工を行い、オーダー替えの指令があると、そのオーダー替えによる次のオーダーに応じた位置決め動作をして次のオーダーの加工を行うシート加工システムにおいて、

前記シート加工装置が前記現行オーダーの加工のために使用されている間に、そのシート加工装置に、自身の次のオーダーのためのデータを供給して当該次のオーダーの位置決め動作の準備をしておき、その現行オーダーの加工後に、前記供給を受けているデータに基づき次のオーダーのための位置決め動作を行うことを特徴とするシート加工システムのオーダー替え制御装置。

【請求項２】　前記シート加工装置が前記現行オーダーの加工のために使用されている間に、そのシート加工装置に、自身の次のオーダーのためのデータを供給するデータ供給手段と、

そのデータの供給に基づき当該シート加工装置の次のオーダーのための位置決め動作の準備をするデータ処理手段と、

そのデータ処理の結果を記憶する記憶手段と、

前記現行オーダーの加工後に、前記記憶手段の記憶内容に基づき、当該シート加工装置の次のオーダーのための位置決め動作を開始させる位置決め動作指令手段と、

を含む請求項１に記載のシート加工システムのオーダー替え制御装置。

【請求項３】　段ボールシート等のシートを送りつつ所定の加工を行うスリッタ及び／又はスコアラ等のシート加工装置が前記シート送り方向において複数組設けられ、その複数組のシート加工装置の任意の組のものがロード位置で現行オーダーの加工をしている間に、他の組のシート加工装置がアンロード位置で次のオーダーのために位置決め動作を行って待機し、オーダー替え指令があると、現行オーダーの加工をしていた前記任意の組のシート加工装置がロード位置からアンロード位置へ移行するのに代わって、次のオーダーの位置決め動作を完了している前記他の組のシート加工装置がアンロード位置からロード位置へ移行して前記次のオーダーの加工を行う形式のシート加工システムにおいて、

前記複数組のシート加工装置の任意のものが前記アンロード位置からロード位置へ移行する時からそのロード位置での加工が終了するまでの間に、当該シート加工装置にとって次のオーダーのためのデータをそのシート加工装置に前もって供給して、そのシート加工装置の次のオーダーのための位置決め動作の準備をしておき、そのシート加工装置がロード位置からアンロード位置へ移行を開始又は完了してから、前記供給されているデータに基づき当該シート加工装置にとって次のオーダーのための位置決め動作を開始することを特徴とするシート加工システムのオーダー替え制御装置。

【請求項４】　前記複数組のシート加工装置の、前記シート送り方向の下流側に、前記複数組のシート加工装置を経た後の前記シートをその送り方向で所定の寸法に切断するカッター装置が設けられ、前記オーダー替えに伴う前記シート加工装置の切替えが完了してから前記カッター装置のカッター切断長が切り替えられるようになっている請求項３に記載のシート加工システムのオーダー替え制御装置。

【請求項５】　前記複数組のシート加工装置の任意のものが前記アンロード位置からロード位置へ移行する時からそのロード位置での加工が終了するまでの間に、当該シート加工装置にとって次のオーダーのためのデータをそのシート加工装置に前もって供給するデータ供給手段と、

そのデータの供給に基づき当該シート加工装置の次のオーダーのための位置決め動作の準備をするデータ処理手段と、

そのデータ処理の結果を記憶する記憶手段と、

前記シート加工装置がロード位置からアンロード位置へ移行を開始又は完了してから、前記記憶手段の記憶内容に基づき当該シート加工装置にとって次のオーダーのための位置決め動作を開始させる位置決め動作指令手段と、

を含む請求項３又は４に記載のシート加工システムのオーダー替え制御装置。

【請求項６】　前記複数組のシート加工装置は、前記シートの送り方向において所定の間隔で配置された第１のスリッタスコアラと第２のスリッタスコアラを備え、前記オーダー替えに伴いこれらが交互に使用されるものである請求項３～５のいずれかに記載のシート加工システムのオーダー替え制御装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】この発明は、主に段ボールシート等のシートを送りつつ所定の加工、例えば裁断（スリッタ）、折り目付け（スコアラ）等の加工を行うシート加工装置に関し、特にそのようなシート加工のオーダー替え（例えば加工寸法の変更）を制御する装置に関する。

【０００２】

【従来の技術】従来、例えば図８（ａ）に示すように、段ボールシートＤＳを長手方向に送りながら、その送り方向に沿って裁断を行うスリッタ２４や、その送り方向に沿って折り目を付けるスコアラ２４’が知られている。図８に示すようなスリッタ２４とスコアラ２４’が互いに近接して一つのユニットを形成するものは、スリッタスコアラ（略称スリスコ）と称される。この例で

は、段ボールシートＤＳをシート幅Ｓで３丁取りして、両端にトリミング幅ｔをとり、かつフラップ幅Ｆで折り目を付ける例を示している。

【０００３】ここで、例えば裁断すべきシート幅Ｓを変えたり、フラップ幅Ｆを変更したりするいわゆるオーダー替えの場合は、同図（ｂ）に示すように、スリッタ２４やスコアラ２４'を軸方向にサーボモータ等で移動させて位置決めすることとなる。

【０００４】図７は、前述のようなスリスコをシート流れ方向に近接して２組設けた２連式のスリスコ１、スリスコ２を示すもので、例えばスリスコ１がシートの加工（裁断・折目付け）を行っている間に、スリスコ２は次のオーダー替えのために予め位置決めして待機しており、オーダー替えの際にはスリスコ１が休止するのに代わって、スリスコ２がシート加工を開始する。また、これらスリスコ１及び２よりさらに下流にはカッター２５があり、裁断や折目付けがされた後の段ボールシートＤＳを、その送り方向と直角に所定の寸法で切断する。

【０００５】

【発明が解決しようとする課題】ところで、図示しない上位生産管理装置からオーダー替え（オーダーチェンジ）の信号が入ると、次の順序でオーダーのセット切替えを行う。上述のオーダーチェンジ信号は、シートのオーダーチェンジ開始点で出力される。これは、スリスコ１に接近するより手前である。いま、スリスコ１が裁断中で、スリスコ２が待機中であるとすれば、オーダーチェンジ開始点がスリスコ１のスリスコ切替点に達すると、スリスコ１は上昇してシートの裁断を止める。そして、オーダーチェンジ開始点がスリスコ２のスリスコ切替点に至ると、スリスコ２が下降してシートの裁断を開始する。なお、スリスコ１で生産されていたオーダーの生産枚数をとり終えるようにオーダーチェンジ開始点でのオーダー替え信号の出力タイミングが設定されているため、スリスコの上記切替えが行われた後、スリスコ２を経たオーダーチェンジ開始点がカッター２５まで来たとき、カッター切断長が変わる。

【０００６】そして、このカッターの切断長（切断寸法）の切替えが完了したときに、待機中のスリスコ１へ次のオーダーのデータ（次オーダーデータ）を上位生産管理装置から送り、データ処理してセットを開始する。

【０００７】図１１はこの流れを示すもので、Ｑ１でオーダーチェンジが開始されると、Ｑ２、Ｑ３、Ｑ４を経た後、Ｑ５で次オーダーデータを転送する。この次オーダーデータは、前述の丁取り数、シート裁断幅、フラップ幅等のデータである。そして、例えば上昇したスリスコ１がその次オーダーデータを受け取った後、Ｑ６でオーダーデータの処理を行う。スリスコの加工部（スリッタ・スコアラ）が、軸方向にサーボモータ等で移動するようになっている場合、次のオーダーの寸法等を設定するにはサーボモータをどれだけ駆動する必要があるか等を算出する。そのデータ処理に基づいて、Ｑ７で実際にスリスコの各加工部を次オーダーデータの各寸法等に応じた位置へ移動させ、これでセットが終了する。そのセット完了状態で再度オーダー替え信号が入れば、このスリスコ１が、加工中のスリスコ２と代わって裁断等を開始することとなる。

【０００８】このように、オーダーチェンジ開始からスリスコの次オーダーセット完了まで、順番にシーケンスを進めるため、相当の時間を要する。このため、小ロオーダー（１回の生産枚数が少ない加工）が続く場合、オーダーチェンジからオーダーチェンジまでの時間が短かくて、次のオーダーセットが間に合わない場合も生じる。つまり、図９（ａ）の従来例に示すように、例えばスリスコ１に着目してみると、オーダー１からオーダー２へのオーダーチェンジ中にスリスコ１がシート裁断に入り、オーダー２からオーダー３のオーダーチェンジ中に、裁断から待機へと変わる。この際、カッター切断長は切断長１から切断長２、さらに切断長３へと変わる。スリスコ１はオーダー２からオーダー３へのオーダーチェンジに伴って上昇し待機状態となるが、スリスコ１にとって次オーダーデータは、カッター切断長の切替えが完了して初めて転送が開始される。そのデータを受け取った後、前述のサーボモータの駆動量等に置き換えるデータ処理を行う。それが完了してから、スリスコの各加工部を実際に軸方向へサーボモータ等で駆動し、それが完了して初めて次のオーダーに対応できる状態となる。

【０００９】このオーダーチェンジ中（転送中＋処理中＋セット中）にオーダー３からオーダー４へのオーダー替えが入っても、オーダーの切替えセットが完了していないため、それには直ちに対応できない。そのようなことから、従来では、生産速度を下げたり、１オーダー当たりの生産オーダー長さ（生産ロット枚数ともいえる）を無理に長くしたり、あるいはそのままオーダーチェンジを行って、スリスコのセットが完了するまでの間に生産されるシートを不良品としたりする必要があった。

【００１０】この発明は、小ロオーダーの場合でも、生産速度を落とさず、スリスコ等のシート加工装置のセット替えを短時間に完了して、生産オーダー長や生産速度の制約を取り除き、かつ生産上のシートのロスを低減することを課題とする。

【００１１】

【課題を解決するための手段】この発明は、特許請求の範囲に記載のとおりのものであるが、その要点は、スリスコ等のシート加工装置が現行オーダーの加工のために使用している間に、その加工装置に、例えば生産管理装置等から次のオーダーのためのデータを供給して、その加工中に次のオーダーの位置決め動作の準備をしておく。そして、オーダー替えの位置決め動作が可能な状態になったらすぐに、その転送データに基づき次のデータのための実際の位置決め動作を行うようにすることにあ

る。

【００１２】例えば２連式のスリスコでは、オーダー替えに伴い、例えばスリスコ１が待機位置（アンロード位置）から加工位置（ロード位置）へ移動したら、次のオーダー替えのデータを転送し、かつ必要であれば位置の駆動量等のデータ処理を行っておき、次のオーダー替え指令があって、スリスコ１がロード位置からアンロード位置への移動開始後、位置決めセット可能な状態になったら、すぐスリスコ１の各加工部を次のオーダー替えの寸法に対応するように位置決めする。つまり、スリスコが運転中に次のオーダーのデータを転送し、オーダーチェンジ開始後、スリスコがセット可能な状態になったら、前述のカッターの切断長の切替えを待たずに、オーダーチェンジとスリスコのセットを別々に、そして並列的に行うことにより、次のオーダーのためのスリスコのセット時間をほとんど無視できるほどに短縮することができる。

【００１３】これにより小ロオーダーが続く場合でも、スリスコセット時間による生産オーダー長や生産速度への制約は低減又は無視できる場合も多くなる。したがって、小ロオーダーの場合でも相当早い生産速度を維持し、また生産オーダー長もセット替えのために長くする必要はなく、また、オーダーチェンジを優先させる場合でも、オーダーチェンジ中の不良品となるシートのロスが低減する。

【００１４】なお、請求項１及び請求項２は、スリスコ等のシート加工装置が単独配置でも複数組の配置でもよい場合であり、請求項３や請求項５は、例えばシート送り方向の上流と下流で２組（２連式）等の複数組のものに限定したものである。また、次のオーダーのためのデータの供給（転送）時期は、実質的にスリスコ等のシート加工装置が待機状態を脱した状態であればよく、早ければアンロード位置からロード位置へ移動を開始したとき、遅い場合は裁断等の加工が終了する直前等に設定できる。また、そのような転送されたデータに基づき、実際の位置決め動作を開始する時期は、例えば２連式等のスリスコの場合、ロード位置からアンロード位置へ移行が完了した時点で開始することができるが、それより前、すなわちロード位置からアンロード位置へ移行中に実際の位置決め動作が可能であれば、その時点から開始することもできる。

【００１５】

【発明の実施の形態】以下、図面に示す実施例を参照しつつ、本発明の実施の形態を説明する。なお、図面に示す実施例では、スリッタ及びスコアラを直列に併設したスリッタスコアラを例にとるが、本発明の適用上、スリッタ単独機あるいはスコアラ単独機、さらには段ボールシートの裁断、折り目付け以外の加工を行う汎用シート加工装置であってもよい。

【００１６】図１では、段ボールシート（以下、単にシートともいう）ＤＳのパスラインＰＬに沿って２台のスリッタスコアラ（スリスコ）１，２が、そのシート送り方向に直列に隣接配置され、交互に使用されるようになっている。スリスコ１は、スコアラ３とスリッタ４とがシート送り方向に直列に隣接されたもので、これが一まとまりのユニットとなる。スリスコ２についても同様で、スコアラ５の下流に隣接してスリッタ６が配置され、このスリスコ２の下流に前述の図７のカッター２５が存在する。スコアラ３及び５は、スコアラ円盤１０，１２によりシートＤＳに送り方向に沿った（送り方向と平行な）折り目を付けるもので、スリッタ４及び６は、上下のスリッタ刃２０及び２２によりシートＤＳを送り方向に挟み裁断する。

【００１７】ところで、スリッタ４又は６は図５（ａ）のように裁断し、スコアラ３又は５は同図（ｂ）のように折り目付けをするが、本発明の適用上、各加工ユニットのシート幅方向の移動機構については同様の構成であるので、代表的にスリッタ６について図２にさらに詳しく示す。スリッタ６は段ボールシートＤＳのパスラインＰＬを挟んで上下の関係で、相互に反対方向に回転する円盤状のスリッタ刃２０，２２を備え、これらがスリッタユニット２４（加工ユニット）の主体をなし、このスリッタユニット２４をシートＤＳの幅方向に複数組（例えば５組）備えている（図３参照）。そして、各々のスリッタ刃２０，２２の間にシートＤＳを供給することにより、そのシートＤＳは送り方向に沿って挟むように切断される。また各スリッタユニット２４のスリッタ刃２０，２２は、シートＤＳを切断するロード位置（加工位置）と、そのシートＤＳから離間するアンロード位置（非加工位置）との間で移動可能に構成される。また各スリッタユニット２４は、シート幅方向に相互に移動自在に配設されて、オーダ変更による丁取り数や丁取り幅等の変更に応じて位置決め調整されるようになっている。

【００１８】すなわち、図３においてスリッタ６のフレーム２６，２６の間には、シートＤＳのパスラインＰＬを挟むように、上下方向に所定間隔おいて一対のビーム２８，３０（図２参照）が平行に掛け渡されている。そして上側のビーム２８に、スリッタ刃２０と同じ数の移動部材３６が一対のガイドレール３４，３４を介して摺動可能に支持されている。この移動部材３６に回転自在に設けたナット（図４の３６ａ）が、両フレーム２６，２６に架設・固定したネジ軸３８に螺合している。そして、各移動部材３６に設けられた個別アクチュエータとしての個々のサーボモータ４０を駆動することにより、そのモータ側のギヤ４０ａとナット３６ａに形成されたギヤ３６ｂとの噛み合いにより、ナット３６ａが回転駆動され、これによって個々の移動部材３６ひいては複数のスリッタ刃２０がそれぞれ個別に水平方向へ移動・位置決めされる。

【００１９】図２で移動部材３６の下側には、ホルダ４４がフレーム２６，２６間に架け渡された水平方向の軸４４ａを支点として、一定角度範囲で回動可能に設けられている。この軸４４ａは、詳しい図示はしないが、複数のスリッタ刃２０を一斉に回転させるための駆動軸である。ホルダ４４はシリンダ４６のピストンロッド４６ａに連結され、このシリンダ４６の伸長により、ホルダ４４ひいてはスリッタ刃２０が、シートＤＳを裁断するロード位置から上方に退避したアンロード位置へ回動するようになっている。

【００２０】前述の下側のビーム３０にも、上側と同様の移動部材３６が上下に対称となる構成で設けられ、下側のスリッタ刃２２についても、上側のスリッタ刃２０と同様にシリンダ４６でロード位置から下方のアンロード位置へ退避するようになっているが、機能的には上側と同様の構成であるため対応する符号を付して説明を省略する。なお、シートＤＳの両サイドの裁断片であるトリミング片は、吸引ダクトにより吸引・回収されるようになっている。

【００２１】次に、図６に基づいて、制御系のブロック図を説明する。上位生産管理装置６０は裁断等を行うコルゲータラインの全体の生産を管理・制御するもので、例えばスリッタやスコアラ（スリスコ）の丁取り数・丁取り幅、さらにスコアラの折り目線の位置等の生産オーダーのデータを格納しており、オーダー替え（オーダーチェンジ）の際はその信号を対象となるスリスコに転送する。また、ロード・アンロード検出センサ６１は、スリスコのロード位置又はアンロード位置への切替えが完了した際に、ロード信号又はアンロード信号を出力するためのセンサで、ロード信号を受けて当該スリスコに次オーダーデータが転送され、アンロード信号を受けて実際のセット（位置決め動作）が開始される。

【００２２】図６の上位生産管理装置６０、ロード・アンロード検出センサ６１は、Ｉ／Ｏポート７０を介してコンピュータ７１に接続されている。コンピュータ７１はＣＰＵ７２、ＲＯＭ７３、ＲＡＭ７４を備えたもので、ＲＯＭ７３にはオーダー替え制御のためのシーケンスプログラム７３ａのほか、必要なプログラムが格納される。またＲＡＭ７４には、スリスコへ転送された次オーダーデータを一時的に記憶するとともに、それに基づいて演算（データ処理）したサーボモータ駆動量のデータ等を一時的に記憶するワークメモリ７４ａのほか、必要なメモリ領域が割り当てられている。

【００２３】さらに、前述の各サーボモータ４０（ＳＭ1～ＳMn）はサーボモータ位置決めユニット（ドライバ）U1～Unを介して、ＣＰＵ７２からの指令により制御される。それらサーボモータＳM1～ＳMnの回転量を確認するための回転量検出器として、パルス発生器ＰＧ1～ＰＧnが各サーボモータ４０に付属し、その回転数パルスがサーボモータ位置決めユニットU1～Unにフィードバックされる。また、スリスコのスリッタ・スコアラ等をロード位置とアンロード位置へ移動させるためのロード・アンロード電磁弁７５が、ＣＰＵ７２により所定のタイミングで駆動され、これにより前述のシリンダ４６が伸縮する。

【００２４】以上、図１のスリッタ６について主に説明したが、スコアラ５、さらにはもう一つのスリッタスコアラ１のスリッタ４やスコアラ３についても、以上と同様なサーボモータ４０等の個別アクチュエータを持っている。

【００２５】次に、オーダー替え制御を主体とする制御の一例を、図９及び図１０に基づいて説明する。いま、図７のスリスコ１が待機中で、スリスコ２がシート加工（裁断・折り目付け）をしている状態で、図６の上位生産管理装置６０からオーダー替え（オーダーチェンジ）の信号が入力されたものと仮定する。このオーダーチェンジの信号は、図７のように現行のオーダー枚数が終了する所定量手前で出力され、そのオーダーチェンジ開始点がスリスコ１に至れば、スリスコ１が図のようにロード位置へ下降し、オーダーチェンジ開始点がスリスコ２に至ればそのスリスコ２がアンロード位置へ上昇する。これとは逆に、スリスコ１がシート加工中で、スリスコ２が待機中の状態からオーダーチェンジが行われる場合は、オーダーチェンジ開始点の到来でスリスコ１が上昇、さらにスリスコ２が下降ということになる。いずれにしてもスリスコ１及び２が切り替わった後、その下流でカッター２５がカッター切断長を次のオーダーのために切り替える。

【００２６】これを図１０でみると、Ｓ１のオーダーチェンジ開始から、Ｓ２及びＳ３は順序が入れ替わる場合があるが、その後Ｓ４のカッター切断長切替えとなる。そして、例えばＳ３で待機中のスリスコ１の機台（以下、単にスリスコ１という）が下降し、図６のロード・アンロード検出センサ６１によりスリスコ１がロード位置へ下降したことが確認されると、図６の上位生産管理装置６０からそのロード位置へ転じたスリスコ１へ次オーダーデータを転送する（Ｓａ１）。これを受けるスリスコ１側では、例えばＲＡＭ７４のワークメモリ７４ａにこれを一時的に記憶し、さらに次オーダーデータに基づく丁取り数、シート幅、フラップ幅、トリミング幅等の寸法変更に応じて、各サーボモータＳM1～ＳMnを各々どれだけ移動させなければならないか等の演算をする。このデータ処理が図１０のＳａ２に対応する。そのデータ処理されたサーボモータ駆動量等のデータも、ワークメモリ７４ａに一時的に蓄えられる。

【００２７】そして、Ｓ５でさらに次のオーダーチェンジが開始され、Ｓ６でそのシート裁断中のスリスコ１の機台が上昇し、図６のロード・アンロード検出センサ６１でアンロード位置へ移行したことが確認されると、Ｓａ３でその上昇したスリスコ１の各機台（各々のスリッ

タやスコアラ）を、次オーダーデータに対応する間隔にセットするために、各々のサーボモータ４０を駆動する。各サーボモータ４０の駆動量は、前述のデータ処理によってワークメモリ７４ａ等に一時的に記憶されているデータに基づいており、それぞれのサーボモータ４０の駆動により、図４に示した機構で、各スリッタユニット２４等が軸方向へ移動し、次のオーダーに備える。

【００２８】また、Ｓ６のスリスコ１の上昇と入れ替わって、Ｓ７のスリスコ２が下降すると、上述のＳａ１～Ｓａ３と同様に、Ｓｂ１でその下降したスリスコ２へ次オーダーデータが転送され、Ｓｂ２で、そのデータに基づくサーボモータ駆動量等の演算（データ処理）が行われ、Ｓ２でそのシート裁断中のスリスコ２が上昇したとき、Ｓｂ３で次オーダーのためのスリスコ２のセット（サーボモータ４０による位置決め動作）が実行される。

【００２９】このように、オーダーチェンジに伴って、シート加工を開始するスリスコへカッター切断長の切替えを待たずに次オーダーデータを転送し、かつそのデータ処理をして待機し、このスリスコが上昇したら、直ちに位置決め動作を開始するという並列処理、つまりＳ１～Ｓ４や、Ｓ５～Ｓ８のオーダーチェンジの流れと、Ｓａ１～Ｓａ３や、Ｓｂ１～Ｓｂ３のスリスコセットの流れとが並列的に実行される。

【００３０】図９（ｂ）はこの様子をタイムチャートで示すもので、例えばスリスコのＮｏ．１機台（スリスコ１）が待機中でオーダー１からオーダー２に替えるオーダーチェンジ信号が入ると、スリスコ１が下降してシート裁断を開始する。このときスリスコ１へ自身にとって次オーダーデータ（この場合はオーダー３のデータであり、生産ラインにとっては次々オーダーデータとなる）を転送し、そのデータに基づいて位置決め動作のためのデータ処理を行う。そして、オーダー２からオーダー３へのオーダーチェンジ信号が入ると、スリスコ１は上昇するが、その上昇が完了すると、オーダー３のための位置決め動作（セット）を行う。そして、そのセットが完了して直ちに下降すれば、オーダー３へのオーダーチェンジに間に合う場合も多くなる。

【００３１】実際のシートの走行速度は、例えば２００～４００ｍ／分（秒速数メートル）であり、このように高速で稼働することが生産効率を高める上で有効であるため、生産速度を落とさずに小ロオーダーから次のオーダーに入れることで、切替え時のシートのロスを最小限とできる。

【００３２】従来の図９（ａ）は、例えばオーダー１からオーダー２へのオーダーチェンジ信号が入り、カッターにおける切断長１が切断長２に切り替えられてから、スリスコへのデータの転送、そのデータ処理、さらにスリスコのセットを直列方式で行うものであるため、切断長２から切断長３に切り替えられてから、データ転送時間＋データ処理時間＋セット時間を経たあとでないと、次のオーダーチェンジ（オーダー４）に対応できないため、相当のシートロスが生じるが、（ｂ）では、切断長２から切断長３への切替え以前にスリスコセットが完了していれば、実質上シートのロスなくオーダー３へのオーダーチェンジが可能となる。

【００３３】つまり図７において、オーダーチェンジ開始点からカッター切断長切替点までの距離をＬ、シート速度をＶ、生産管理装置からスリスコへの次オーダーデータ転送時間をｔ1、スリスコのデータ処理時間をｔ2、スリスコセット時間をｔ3とすれば、オーダーチェンジから次オーダーセット完了までの必要時間は、次のようになる。

（Ｌ／Ｖ）＋ｔ1＋ｔ2＋ｔ3

【００３４】これに対し本発明では、図７におけるスリスコ切替点からカッター切断長切替点までの距離をａ又はｂとしたとき、オーダーチェンジ開始からスリスコのセット完了までの時間は、次のようになる。

｛（Ｌ－ａ（又はｂ））／Ｖ｝＋ｔ2＋ｔ3

なお、オーダーチェンジから次オーダーセット完了までの最小時間は、Ｌ／Ｖとなる。この時間内に次オーダーセット完了すれば、短いロットのオーダー替えにも直ちに対処できる。

【図面の簡単な説明】

【図１】２連式構造のスリッタスコアラ（スリスコ）を概念的に示す図。

【図２】図１のスリッタユニットの部分を取り出して示す正面図。

【図３】その側面図。

【図４】各加工ユニットを位置決め・移動する個別アクチュエータの一例を示す正面図。

【図５】スリッタユニット及びスコアラユニットの主要部を示す図。

【図６】制御系の一例を示すブロック図。

【図７】２連式のスリスコとカッターの配列関係を模式的に示す図。

【図８】スリスコの各スリッタとスコアラの配置及び位置決めを説明する図。

【図９】本発明のオーダー替え制御の一例を従来例と比較して示すタイムチャート。

【図１０】本発明のオーダー替え制御の一例を示すフローチャート。

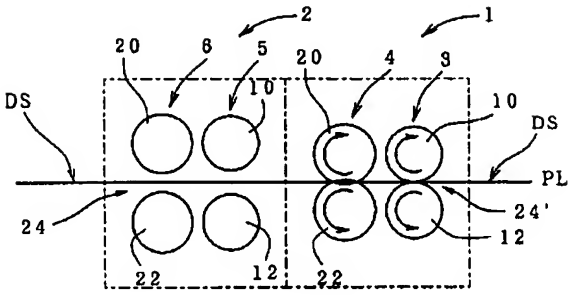
【図１１】従来例のオーダー替えの流れを示すフローチャート。

【符号の説明】

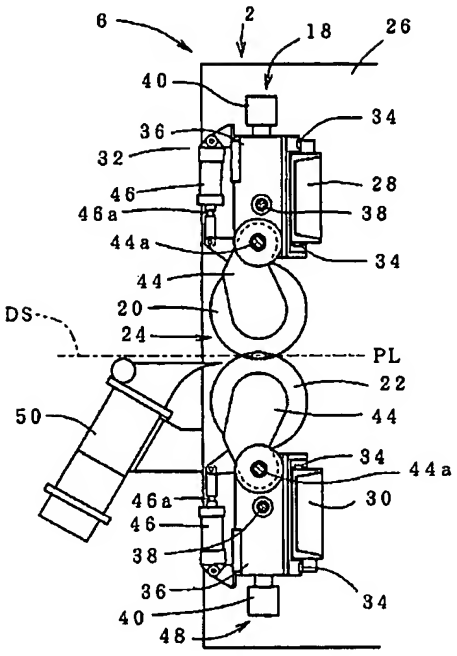
１、２　スリッタスコアラ（スリスコ）
３、５　スコアラ
４、６　スリッタ
１０、１２　スコアラ円盤
２０、２２　スリッタ刃

３６　移動部材
３８　ネジ軸
４０　サーボモータ（個別アクチュエータ）
６０　上位生産管理装置
６１　ロード・アンロード検出センサ

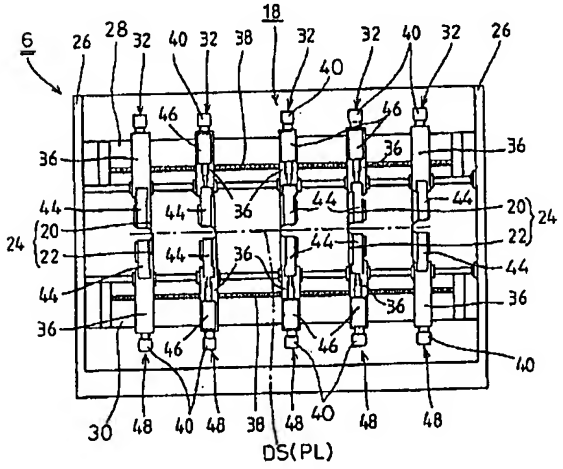
【図１】



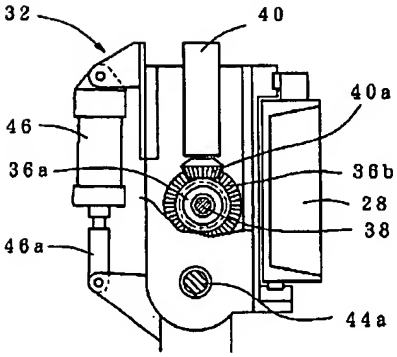
【図２】



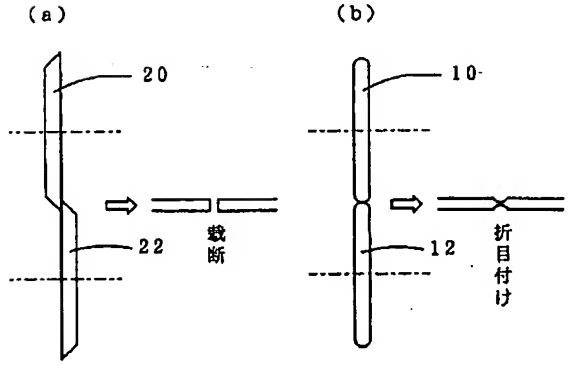
【図３】



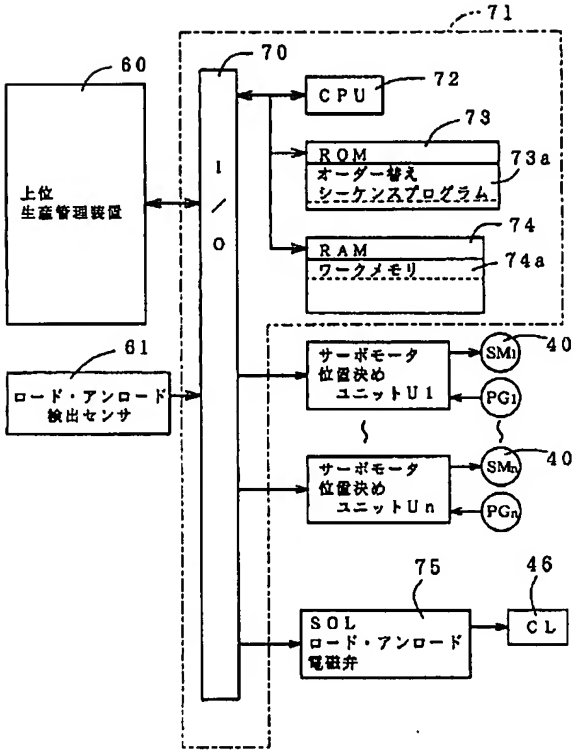
【図４】



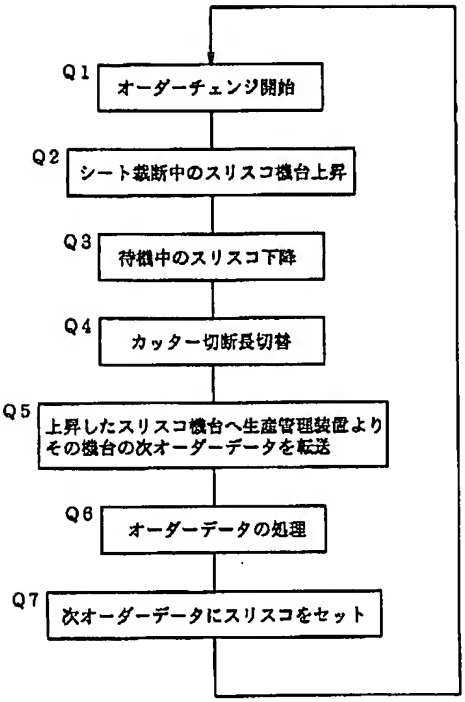
【図５】



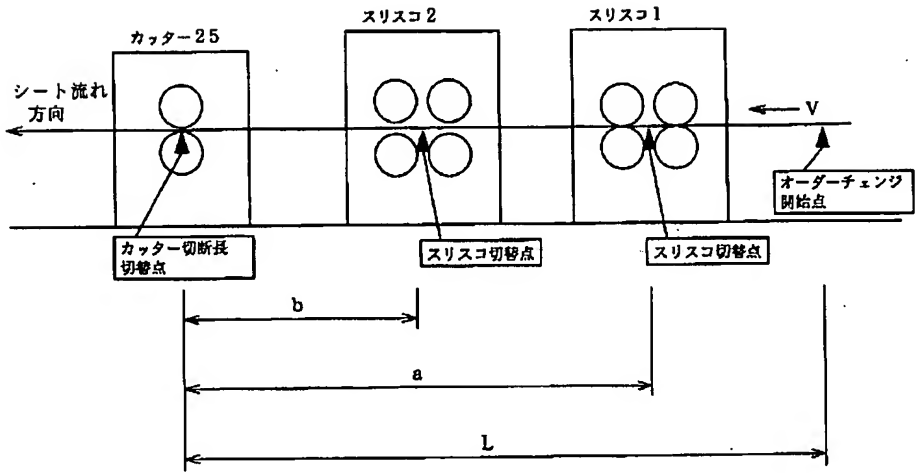
【図６】


71
70
60
CPU
72
73
ROM
オーダー替え
シーケンスプログラム
73a
上位
生産管理装置
I
/
O
74
RAM
ワークメモリ
74a
61
ロード・アンロード
検出センサ
サーボモータ
位置決め
ユニットU1
SM1
40
PG1
サーボモータ
位置決め
ユニットUn
SMn
40
PGn
75
46
SOL
ロード・アンロード
電磁弁
CL

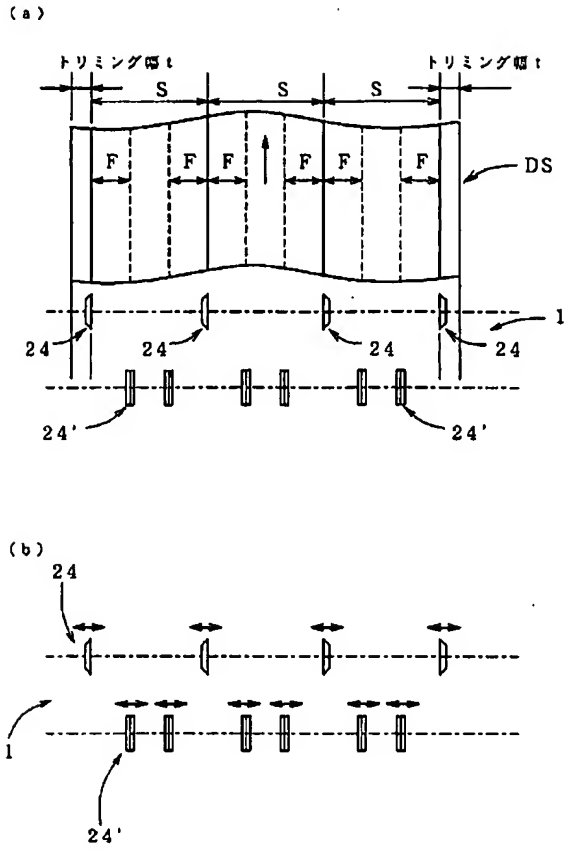
【図１１】


Q1
オーダーチェンジ開始
Q2
シート裁断中のスリスコ機台上昇
Q3
待機中のスリスコ下降
Q4
カッター切断長切替
Q5
上昇したスリスコ機台へ生産管理装置より
その機台の次オーダーデータを転送
Q6
オーダーデータの処理
Q7
次オーダーデータにスリスコをセット

【図７】


カッター25
スリスコ2
スリスコ1
シート流れ
方向
V
オーダーチェンジ
開始点
カッター切断長
切替点
スリスコ切替点
スリスコ切替点
b
a
L

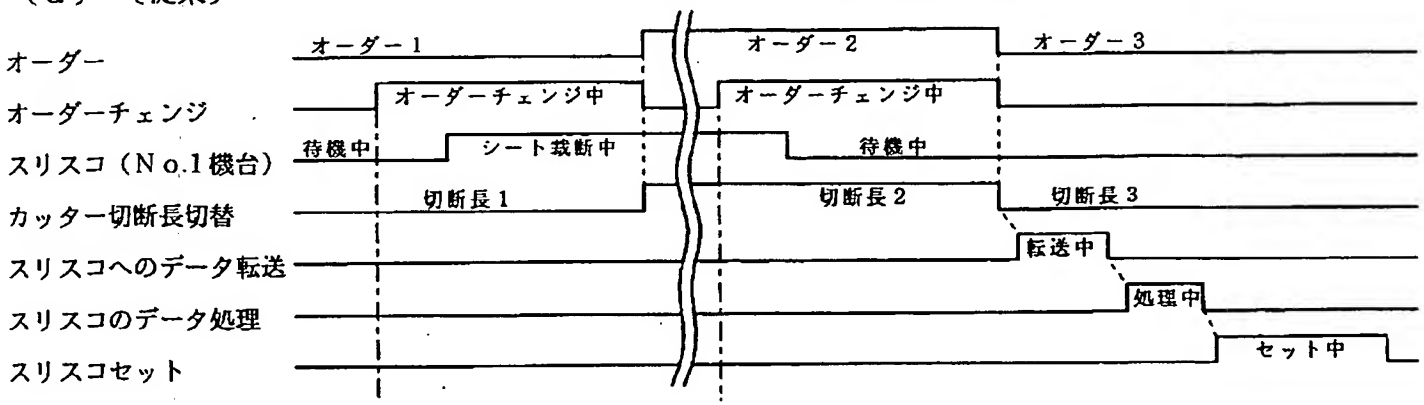
【図８】



【図９】

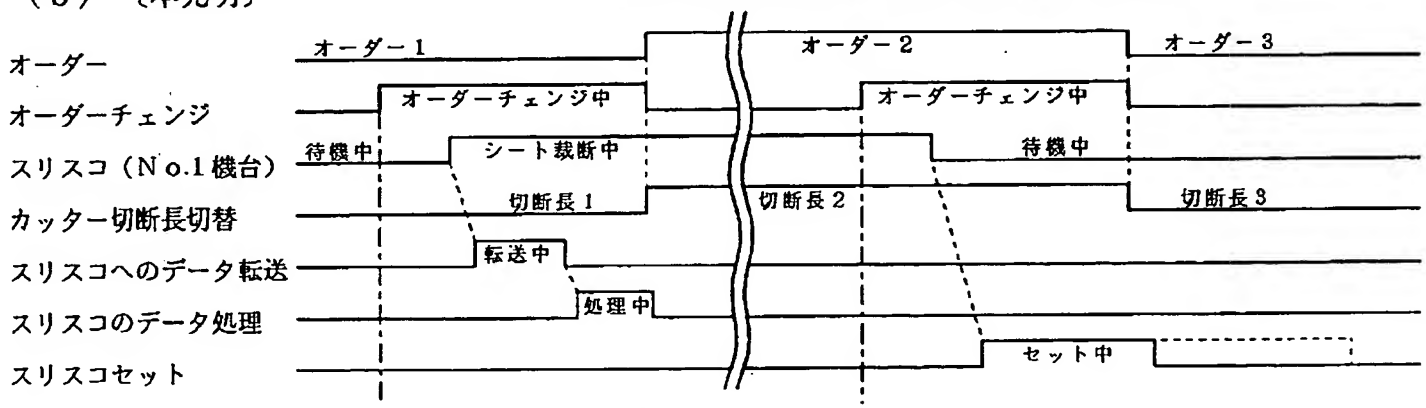
（ａ）〔従来〕

※スリスコはＮｏ.１機台のみで図を簡略化している

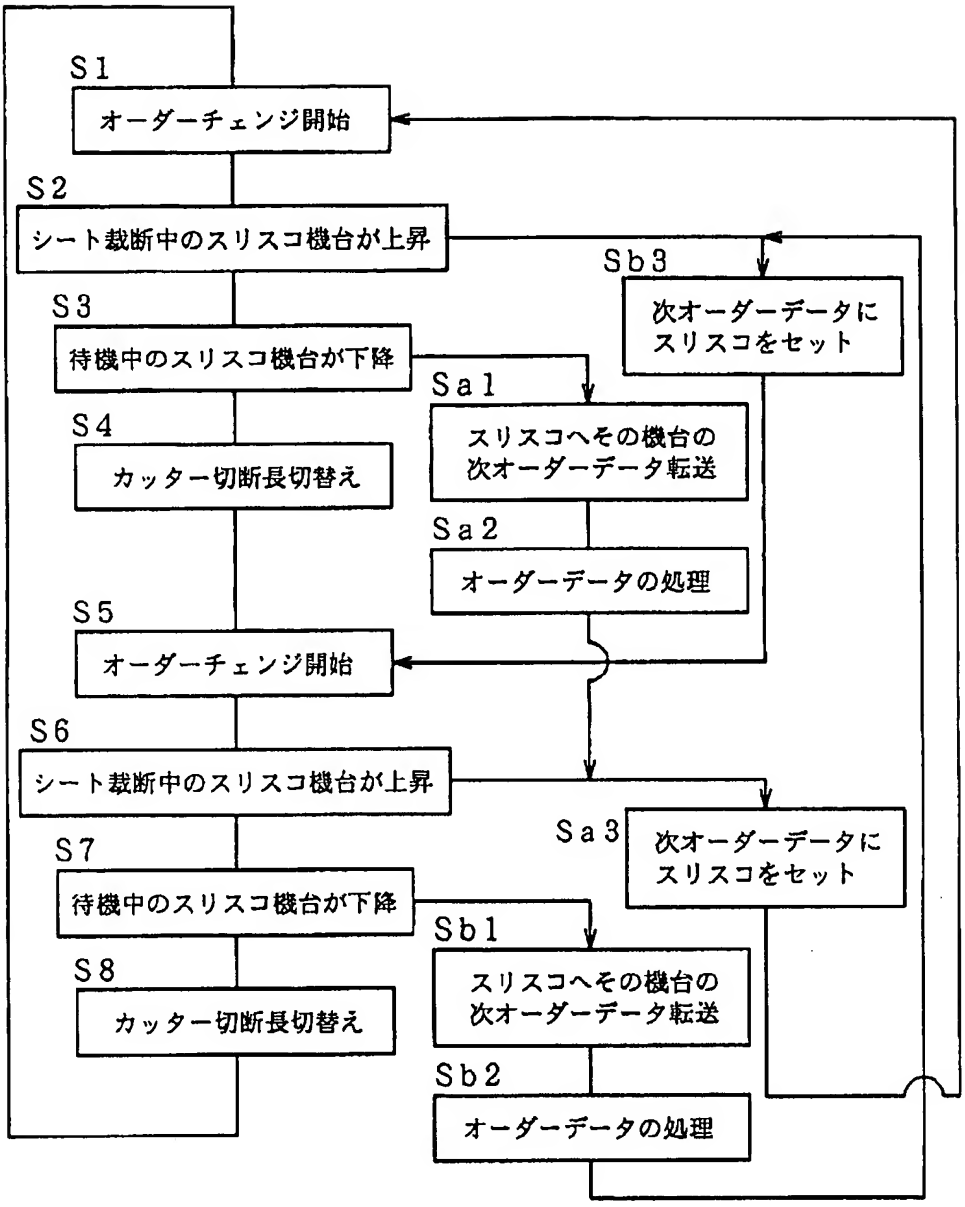


（ｂ）〔本発明〕

※スリスコはＮｏ.１機台のみで図を簡略化している



【図１０】


S1
オーダーチェンジ開始
S2
シート裁断中のスリスコ機台が上昇
Sb3
次オーダーデータに
スリスコをセット
S3
待機中のスリスコ機台が下降
Sa1
スリスコへその機台の
次オーダーデータ転送
S4
カッター切断長切替え
Sa2
オーダーデータの処理
S5
オーダーチェンジ開始
S6
シート裁断中のスリスコ機台が上昇
Sa3
次オーダーデータに
スリスコをセット
S7
待機中のスリスコ機台が下降
Sb1
スリスコへその機台の
次オーダーデータ転送
S8
カッター切断長切替え
Sb2
オーダーデータの処理